

U.S. Patent Application Serial No. 10/647,237  
Response filed March 14, 2005  
Reply to OA dated October 12, 2004

### **REMARKS**

Claims 1-21 are pending in the application. Claims 1-4, 6, 7, 9, 10, 10, 13, 15, 17 and 20 are amended herein. The specification has also been amended. Applicant submits that no new matter has been added by these amendments. The amendments are discussed below with regard to the objections and rejections.

#### **The Examiner has objected to the specification.**

The objection is overcome in part by the amendments to the specification, and is traversed in part. The issues raised by the Examiner are addressed below:

On page 1, line 19, the wording “on a base of” has been changed to –based on–.

On page 1, line 21, the wording “... it is known that it is possible to make the size inside the waveguide small to a size of  $\epsilon_r^{-1/2}$  times ....” has been amended for clarity to read: --... it is known that it is possible to make the size inside the waveguide as small as  $\epsilon_r^{-1/2}$  times ....–.

On page 2, line 7, the typographical error “lose” has been corrected to –loss–.

On page 3, line 1, the phrase “it is known that the c-axis oriented film is easy to pass a superconductive current along the film surface direction ...” has been amended to read: --it is known that it is easy to pass a superconductive current along the film surface direction of a c-axis oriented film ....–.

On page 3, lines 6-7, “several ten K or more” has been amended to -- several tens of Kelvins or more–.

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Page 3, lines 8-9, have also been amended for grammatical clarity.

On page 6, lines 12 and 22, “indium 102 and 107” has been amended to “indium layers 102 and 107”.

On page 6, line 16, the term “M1.2” has been explained to be an abbreviation for “metric screws having a threaded portion with nominal diameters of 1.2 mm”.

The objection regarding “A lump of the MgO single crystal ....” on page 8, line 3, is respectfully traversed. Applicant submits that it is clear that “lump” means “piece” here.

The objection regarding the term “45° bent structure” is also traversed. Applicant submits that “bent” is an adjective, and that the word combination “45° bent” is being used correctly as an adjective.

The spelling error on page 11, line 19, has been corrected.

On page 12, line 1, the word “excepting” has been replaced with the more common usage “except for”.

The variables  $n_1$ , etc., on page 17, have been subscripted.

The Examiner also states that Fig. 3 needs a detailed description. However, Fig. 3 is described on page 10, line 5, of the Detailed Description section, and the reference numerals of Fig. 3 are explained. No amendment has been made in this regard.

Applicant submits that the above amendments represent only minor amendments to the form of the specification and that no new matter is added by these amendments.

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**Claims 2, 6 and 9 are rejected under 35 U.S.C. §112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.**

The rejection is overcome by the amendments to the claims.

With regard to claim 2 (and dependent claim 9), the Examiner states that it is unclear which surface “the surface” in lines 7 and 14 of the claim, refers to. The recitation of “the surface” has been amended to –said surface– to clearly indicate the antecedent basis in line 4 of claim 2. (Only one surface has been previously recited for the second single crystal magnesium oxide block). In addition, for clarity, the phrase “of said second single crystal magnesium oxide block” is added at the end of the claim.

Claim 6 has been amended for clarity with regard to “the portion” in line 6 of the claim. The recitation of “the portion to directly bond to said first copper oxide superconducting film” has been amended to – the portion of the fixture that directly bonds to said first copper oxide superconducting film-- . It may be seen from the specification on page 11, lines 4-11, that “the portion” refers to the portions of the fixture or pedestal, specifically, the portion making close contact directly with the copper oxide superconducting film. That the fixture and pedestal are made of the recited materials may also be seen on page 10, lines 20-27.

The Examiner notes that trademarks should not be recited in a claim, with reference to claim 6. Applicant has deleted the terms Kovar and Invar from claim 6, replacing these with the generic “Fe-Ni-based alloys with low thermal coefficient”. The specification has also been amended on page 11, lines 6-7, to include this designation, and the trademark “KOVAR” has been placed in all

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capitals on page 11 and on page 10, line 22. In Applicant's understanding, Invar is not a trademark. Applicant submits that it is well known that KOVAR and Invar represent Fe-Ni-based alloys with low thermal coefficient, and that no new matter is added by this amendment.

**Claims 1, 2, 4, 6, 7 and 10 are objected to.**

The objection is overcome by the amendments to the claims. As suggested by the Examiner, "formed" is amended to –disposed–.

**Claims 3 and 9 are objected to because of a minor informality.**

The objection is overcome by the amendments to the claims. The variables have been subscripted.

**Claims 1, 3, 7, 8, 10, 20 and 21 are rejected under 35 U.S.C. §102(b) as being clearly anticipated by Matsuura et al.**

The rejection of claims 1, 3, 7, 8, 10, 20 and 21 is overcome by the amendments to claims 1 and 20, and reconsideration of the rejection is respectfully requested.

In the amendment, the recited superconducting film is disposed on said surface "in a c-axis crystal orientation perpendicular to four or more faces of said block ~~the surface~~." Support for this amendment may be found on page 5, lines 12 to 26, of the specification, where it is described that

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the “superconducting film is formed on two XZ and two YZ faces among six faces of the MgO block 101,” that is, on four faces of the block.

The Examiner cites Matsuura et al. (“Matsuura”) in column 3, lines 35-36, and 58, as disclosing a substrate that is a MgO single crystal. The reference discloses that an oxide superconductive film can be deposited on the (100) surface of the MgO single crystal substrate (column 3, line 56). The superconductive film may be a “copper-oxide type oxide superconductor” (column 3, line 27).

However, in Matsuura, the film is formed only on **one face** of the substrate.

In Matsuura, a microwave component includes a superconducting signal conductor formed on a first dielectric substrate, and a superconducting ground conductor formed on a second dielectric substrate. The first dielectric substrate is stacked on the superconducting ground conductor of the second dielectric substrate. Each of the superconducting signal conductor and the superconducting ground conductor is formed of an oxide superconductor thin film of which crystals are orientated in such a manner that the c-planes of the crystals are parallel to the direction in which an electromagnetic field generated by microwave launched to the microwave component changes.

Again, in the present claims, a MgO crystal block has a material structure such that an oxide superconducting film in crystal is formed on four or more surfaces of the MgO crystal block in a c-axis crystal orientation perpendicular to the surfaces thereof. This structure is not found in Matsuura, and Matsuura therefore does not anticipate independent claims 1 and 20, nor the dependent claims.

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Applicant also submits that Matsuura does not suggest the structure recited in the present claims. Moreover, the present invention provides results not obtainable with the invention of Matsuura.

Matsuura is considered to be a quasi-TEM mode or a TEM mode in structure. Since a side wall of the NRD-type waveguide shown in the patent is open with respect to the traveling direction of an electromagnetic wave, leakage of an electromagnetic field to the outside is assumed. On the contrary, in the present application, since a shield having a low surface resistance of the side surface owing to a c-axis orientation superconducting film is formed, a waveguide in a low conductor-loss TE/TM mode can be formed, and has the effect that there is, in principle, no leakage of electromagnetic field into its external environment as with the LSM type.

This effect is provided because oxide superconducting film is formed so as to cover a surface to be a side wall with respect to the traveling direction of the electromagnetic wave and is in a c-axis orientation perpendicular to the surface thereof in the block structure of the MgO crystal. While oxide superconductors such as the Y123 series or the like are characterized in that supercurrent easily flows along a crystal-c face, the surface of MgO crystal rectangular solid is made to correspond to a crystal face of either (100), (010), or (001) so that it is easy to form an oxide superconducting film in c-axis orientation perpendicular to the surface thereof. In other words, a superconducting film having suitable crystal orientation cannot be obtained on a surface of, for example, a (110) MgO crystal face.

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The condition of superconducting film in c-axis orientation for a substrate having superconducting film in Matsuura relates to only one side of the substrate, and a shield effect such as is obtainable by the present application cannot be expected.

Applicant therefore submits that the claims, as amended, are neither anticipated by, nor obvious over, Matsuura et al. (U.S. Patent No. 5,512,539).

**Claims 11 and 12 are rejected under 35 USC §103(a) as being unpatentable over Matsuura et al.**

The rejection is overcome by the amendment to base claim 1. As discussed above, since Matsuura does not disclose a film on four or more faces of a MgO block, claim 1 as amended is not anticipated by, nor obvious over, Matsuura. Dependent claims 11 and 12 are therefore also not obvious over this reference.

**Regarding Ishikawa et al. (U.S. 6,100,983) (“Ishikawa”).** Ishikawa was made of record but not cited in a rejection. Applicant respectfully notes that Ishikawa does not disclose a superconducting film formed on four or more surfaces of a MgO crystal block.

In view of the aforementioned amendments and accompanying remarks, claims 1-21, as amended, are in condition for allowance, which action, at an early date, is requested.

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If, for any reason, it is felt that this application is not now in condition for allowance, the Examiner is requested to contact Applicant's undersigned agent at the telephone number indicated below to arrange for an interview to expedite the disposition of this case.

In the event that this paper is not timely filed, Applicant respectfully petitions for an appropriate extension of time. Please charge any fees for such an extension of time and any other fees which may be due with respect to this paper, to Deposit Account No. 01-2340.

Respectfully submitted,

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